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Three New Labrid Fishes of the Genus *Coris* from the Western Pacific[1]

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ABSTRACT: Three new species of the labrid fish genus *Coris* are described: *C. pictoides* from Malaysia, Celebes, and eastern and western Australia; *C. aurilineata* from southern Queensland and New South Wales; and *C. bulbifrons* from Lord Howe Island, Norfolk Island, Middleton Reef, and, rarely, New South Wales. *Coris pictoides* is a small species (largest, 89 mm SL) distinctive in having 48–51 lateral-line scales and in being whitish with a broad black stripe from snout through eye, along upper side of body, ending in upper central part of caudal fin, this stripe separated by a narrow white band from a middorsal black stripe. *Coris aurilineata* is also a small species (largest, 98 mm SL) with a low (49–51) lateral-line scale count; it is green with orange-yellow stripes which are narrow dorsally and relatively broad ventrally; a small blackish spot is present at upper base of caudal fin and another at upper base of pectoral fin; females have a large elliptical blue-edged black spot basally in soft portion of dorsal fin. *Coris bulbifrons* is the largest species of *Coris*, reaching a length of about 1 m; it has 61–66 lateral-line scales; juveniles have irregular, broad, dark-brown stripes alternating with narrow pale, partially broken bands; adults are bluish gray; both sexes develop a prominent convexity in the upper head profile anterodorsal to the eye. This has given rise to the common name "doubleheader" at Lord Howe Island.

THE WRASSES OF THE GENUS *Coris* are represented by a single species in the eastern Atlantic and Mediterranean Sea and an undetermined number from the Indo-West-Pacific. Most species are strikingly marked, often displaying a variety of different colors. This has led to their being called rainbow fishes or rainbow wrasses by some authors. Actually, the generic name has become increasingly popular as a general common name for these fishes, and we endorse this usage here.

The genus *Coris* was proposed by Lacépède (1801); the type species is the large *C. aygula* Lacépède, which ranges from the Red Sea to French Polynesia. Although some, authors such as Norman (1957), have placed *Pseudocoris* Bleeker and the monotypic *Ophthalmolepis* Bleeker in the synonymy of *Coris*, we prefer to regard these as valid genera.

The genus *Coris* is characterized as follows: a moderately elongate compressed body; IX,12 dorsal rays; III,12 anal rays; continuous lateral line; small scales (50 to more than 80 in lateral line); naked head (except where scaled dorsally); slightly emarginate to rounded caudal fin; a single series of conical teeth in jaws increasing in size anteriorly, the most anterior as well-developed canines; a few rows of small nodular teeth in jaws medial to lateral conical series; some enlarged molariform teeth on upper and lower pharyngeal bones in addition to small blunt conical teeth and small molars.

Through correspondence, the authors determined that each had obtained specimens of

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three new species of *Coris* from Australia, Lord Howe Island, and Malaysia. The purpose of the present paper is to describe these three fishes. The senior author has commenced a revision of all Indo-Pacific members of the genus.

Two of our new species are unusually drab for *Coris*. Curiously, one of these represents the smallest species of the genus (our largest specimen measures 89 mm SL) and the other the largest species (Lord Howe Island angling record, 14 lb). All three of our fishes exhibit surprisingly little sexual dimorphism for the genus. Most species have been named two or more times because of differences in the sexes, especially in color (and also for some, differences from juvenile to adult). As recently as 1976, Randall reduced the number of species of the genus from the Hawaiian Islands from six to four after elucidating the color changes with sex reversal.

MATERIALS AND METHODS

Type specimens of the new species have been variously deposited in the Academy of Natural Sciences of Philadelphia (ANSP); Australian Museum, Sydney (AMS); Bernice P. Bishop Museum, Honolulu (BPBM); British Museum (Natural History), London [BM (NH)]; California Academy of Sciences, San Francisco (CAS); Museum National d'Histoire Naturelle, Paris (MNHN); National Museum of Victoria, Melbourne (NMV); U.S. National Museum of Natural History, Washington, D.C. (USNM); and Western Australian Museum, Perth (WAM).

In the descriptions of new species, data in parentheses refer to paratypes. More measurement data are given in the tables than are summarized in the text. Proportional measurements in the text are rounded to the nearest 0.05. Lengths given for specimens are standard length (SL), taken from the front of the upper lip or upper canine teeth (whichever is most anterior) to the posterior end of the hypural plate (base of caudal fin). Head length is the distance from the same anterior point to posterior end of opercular flap. Depth of body is the greatest depth (adjusting for any obvious malformations from preservation). Width of body is measured just posterior to gill opening. Orbit diameter is the fleshy diameter, but interorbital width is the bony width. Depth of caudal peduncle is the least depth; length of caudal peduncle is measured horizontally from rear base of anal fin to base of caudal fin. Lengths of spines and rays are measured to their extreme bases. Pectoral-ray counts include the uppermost rudimentary ray. Gill-raker counts include all rudiments.

Coris pictoides, new species

Plate IA, Figure 1

HOLOTYPE: BPBM 26412, 58.5 mm SL,

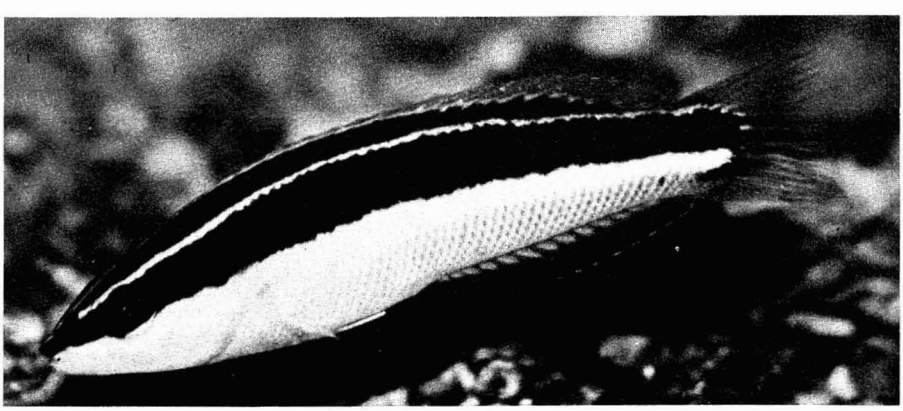


FIGURE 1. *Coris pictoides*; 89 mm SL; Clovelly, New South Wales (aquarium photograph).

TABLE 1

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Coris pictoides* (EXPRESSED AS A PERCENTAGE OF STANDARD LENGTH)

	HOLOTYPE,	PARATYPES						
	BPBM 26412	BPBM 21894	MNHN 1981-610	ANSP 146393	BPBM 21934	BPBM 21894	AMS I.21048-001	AMS I.21046-001
Standard length (mm)	58.5	29.6	41.0	50.2	63.8	64.7	69.2	89.0
Depth of body	28.5	28.5	28.8	27.9	27.2	27.5	28.9	28.9
Width of body	12.6	12.4	12.9	12.3	11.6	12.1	11.9	13.3
Head length	31.5	36.1	33.5	33.0	33.6	31.8	32.8	34.0
Snout length	10.3	10.8	10.0	10.2	10.6	9.8	9.8	Deformed
Orbit diameter	6.6	8.9	8.0	6.8	6.9	6.4	6.2	6.3
Interorbital width	6.1	6.7	6.2	6.1	6.2	5.9	6.3	6.6
Depth of caudal peduncle	14.7	15.2	15.4	15.3	14.7	15.4	15.6	14.6
Length of caudal peduncle	8.8	7.8	7.8	9.1	7.7	8.6	8.9	8.1
Predorsal length	30.3	35.7	33.0	31.0	31.4	29.6	30.1	31.7
Preanal length	54.5	58.5	56.7	55.0	56.2	55.4	57.4	56.7
Prepelvic length	31.7	35.5	33.2	32.5	33.3	33.2	32.9	33.7
Length of first dorsal spine	5.3	6.1	6.5	5.4	5.8	5.5	Broken	6.7
Length of ninth dorsal spine	9.3	Broken	10.4	10.1	9.4	10.1	10.1	11.4
Length of longest dorsal ray	12.3	14.2	13.7	13.7	12.9	12.8	13.1	14.1
Length of first anal spine	3.8	4.5	4.6	4.9	3.6	4.9	3.7	5.1
Length of third anal spine	8.2	9.7	9.7	9.6	8.3	8.6	8.9	9.1
Length of longest anal ray	12.1	13.8	12.7	12.9	12.2	11.8	12.6	12.5
Length of caudal fin	22.4	24.6	23.2	22.7	22.7	22.4	21.7	23.0
Length of pectoral fin	18.0	19.7	18.5	18.3	19.5	19.2	20.1	19.1
Length of pelvic spine	10.2	12.0	12.0	10.2	11.0	12.1	10.1	12.2
Length of pelvic fin	15.5	15.5	15.4	15.7	15.7	16.2	15.7	19.1

female, Malaysia, Tioman Island, west side off Bunut (2°47′50″ N, 104°07′40″ E), 9 m, rubble and sand bottom with a few small isolated coral heads, multiprong spear, J. E. Randall, 2 August 1977.

PARATYPES: AMS I.21046-001, 89.0 mm SL, male, Australia, New South Wales, off Clovelly (33°55′ S, 151°17′ E), 15 m, hand net, R. H. Kuiter, 3 June 1973 (measured 15 mm when first collected; maintained in aquarium until 2 June 1979); BPBM 15554, 47.8 mm SL, female, Australia, Great Barrier Reef, Hook Island (20°7′ S), west side, 9 m, spear, J. E. Randall, 29 June 1973; BM(NH) 1981.2.11.3, 51.9 mm SL, female, Australia, Great Barrier Reef, Capricorn Group, One Tree Island, outer reef slope, 33 m, spear, B. C. Russell, 26 September 1974; WAM 25109-003, 64.3 mm SL, male, Western Australia, Dampier Archipelago, Kendrew Island (20°28′30″ S, 116°32′ E), spear, G. R. Allen, 1 November 1974; WAM P25110-003, 65.2 mm SL, male, same data as preceding except 2 November 1974; BPBM 21894, 2: 29.6–64.2 mm SL, female and male, respectively, same data as holotype; MNHN 1981–610, 41.0 mm SL, female, same data as holotype; ANSP 146393, 50.2 mm SL, female, same data as holotype; BPBM 21934, 63.8 mm SL, male, Malaysia, Pulau Tulai, northeast corner of islet (2°55′ N, 104°06′ E), 15 m, spear, J. E. Randall, 3 August 1977; USNM 225237, 56.3 mm SL, male, same data as preceding; BPBM 26699, 3: 36.9–52.4 mm SL, Indonesia, Sulawesi (Celebes), Baranglompo Island (west of Ujung Pandang), southwest side, edge of reef, 20 m, spear, J. E. Randall, 6 September 1978; AMS I.21048-001, 69.2 mm SL, female, Australia, Queensland, Great Keppel Island (23°08′ S, 150°56′ E), purchased from aquarium store, R. H. Kuiter, May 1979; CAS 47402, 83.6 mm SL, male, Australia, Queensland, Great Keppel Island, B. T. Hose, 1980.

DESCRIPTION: Dorsal rays IX,12; anal rays III,12; pectoral rays 13 or 14 (usually 14; 1 of 14 paratypes with 13 on both sides and 3 with 13 on one side); pelvic rays I,5; principal caudal rays 14 (median 12 branched); upper and lower procurrent caudal rays 6; pored lateral-line scales 51 (48–51; plus 1 posterior to base of caudal fin); scales above first lateral-line scale to origin of dorsal fin 8 (6–8); scales below lateral line to origin of anal fin 17 (16–17); circumpeduncular scales 28 (28–30); gill rakers 18 (16–20); branchiostegal rays 6; vertebrae 10 + 15.

Body moderately elongate, the depth 3.5 (3.45–3.7) in SL, and compressed, the width 2.25 (2.2–2.4) in depth; dorsal profile of head smoothly convex; head length 3.2 (2.75–3.15) in SL; snout length 3.05 (3.15–3.35) in head; orbit diameter 4.8 (3.35–5.4) in head; interorbital space convex, the width 5.2 (5.15–5.4) in head; caudal peduncle about twice as deep as long, the least depth 2.15 (2.05–2.4) in head.

Jaws with an outer row of close-set, forward-projecting, conical teeth which are progressively longer anteriorly, the two anterior pairs caninelike, somewhat recurved, the second pair about three-fourths as long as the first pair; side of upper jaw with 6 (5–6) conical teeth posterior to the first two pairs, and 1 canine (rarely 2) at corner of mouth (except smallest paratype); side of lower jaw posterior to anterior two pairs of teeth with 8 (7–9) conical teeth; an inner row of smaller teeth in jaws, the most anterior (behind anterior canines) conical and somewhat compressed, the second tooth bluntly conical, and the remaining teeth nodular.

Pharyngeal dentition of 83.6-mm paratype: each upper pharyngeal bone with 17 teeth in five anterior–posterior rows, the first row of 1 conical tooth, the second row of 3 teeth, the most lateral somewhat conical, the remaining bluntly conical to molariform; median tooth of the third and fourth rows slightly enlarged, molariform (the one in the third row largest); median limb of T-shaped lower pharyngeal bone with 10 teeth in two rows, the anterior teeth conical, becoming progressively more molariform posteriorly; posterior limb of pharyngeal bone with two to three rows of teeth, the back row of 11 teeth, the median one a moderately enlarged ovate molar, the remaining teeth progressively smaller and less molariform laterally.

Lips not fleshy, the outer surface smooth except posteriorly on side of upper lip where slightly plicate; inner surface of upper lip with 6 well-developed plicae; lower lip with a well-developed ventral flap. Tongue short and broadly rounded.

Gill membranes broadly attached to isthmus with a free fold across; longest gill filaments of first arch contained about 2.2 times in orbit diameter; gill rakers moderate, the longest on first arch nearly half length of longest gill filament.

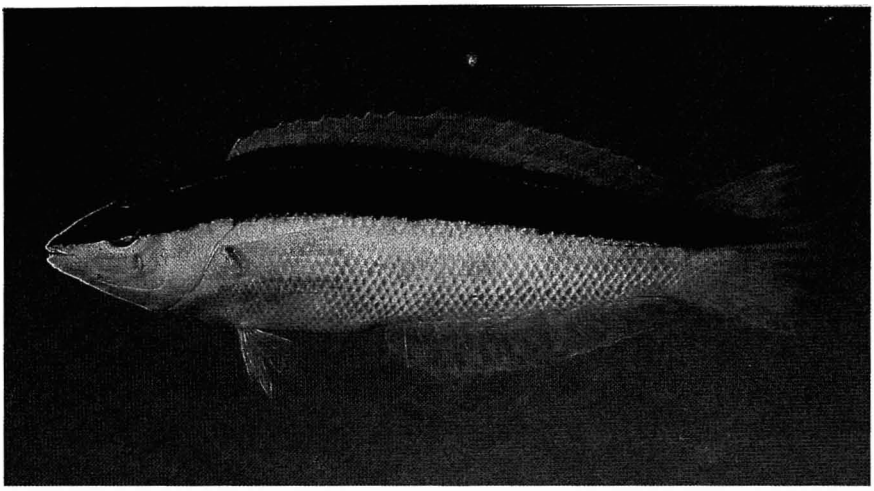
Lower margin of preopercle free to below anterior edge of orbit; upper margin of preopercle free nearly to level of lower edge of orbit.

Anterior nostril in a membranous tube in front of dorsal fourth of orbit; posterior nostril larger, oval, covered by a flap from the front, anterior to upper eighth of orbit; internarial distance about one-fourth orbit diameter.

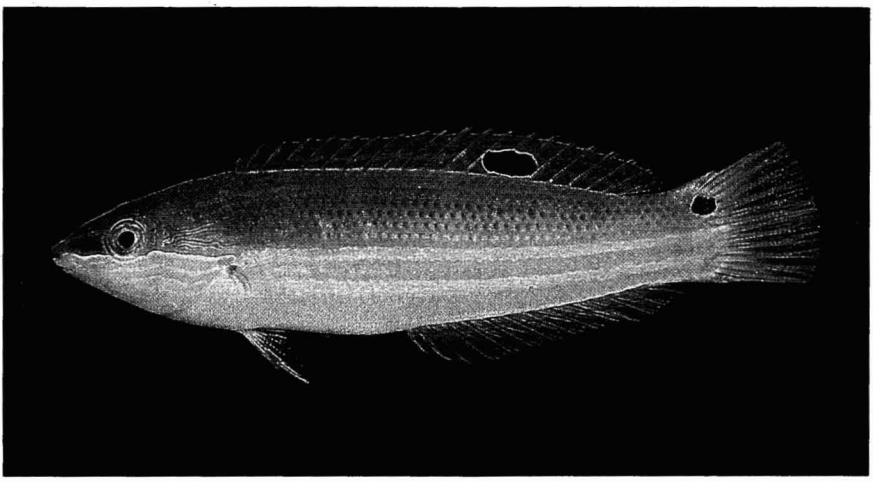
Suborbital pores rimming eye from midposteriorly to below front edge of orbit 6 (6–11); pores along free margin of preopercle 10 (9–10), with another 3 or 4 anterior in mandibular series; a series of 6 pores beginning posteriorly on each side of interorbital space and ending anterior to anterior nostril; a pore just ventral to anterior nostril; a single pore in midinterorbital space; a series of about 8 pores across upper edge of operculum from front of lateral-line origin to above posterior edge of orbit.

Lateral line continuous, rising steeply at its anterior end, following contour of back to beneath base of tenth dorsal soft ray, then angling sharply downward to straight midlateral peduncular portion; tubules of most lateral-line scales of anterior half of body with oblique dorsal and ventral branches, each ending in a single pore; remaining scales with one pore.

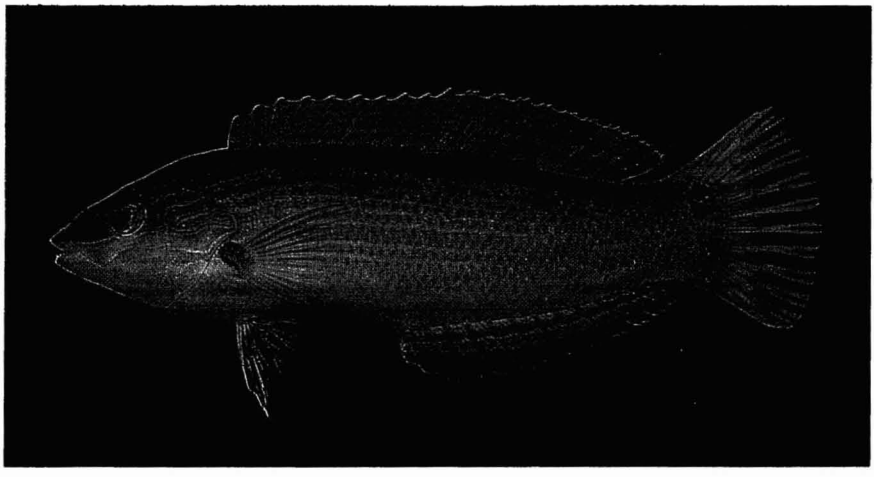
Head naked except for small scales on nape in about ten diagonal rows which extend slightly anterior to a vertical at upper end of preopercular margin; scales on side of thorax



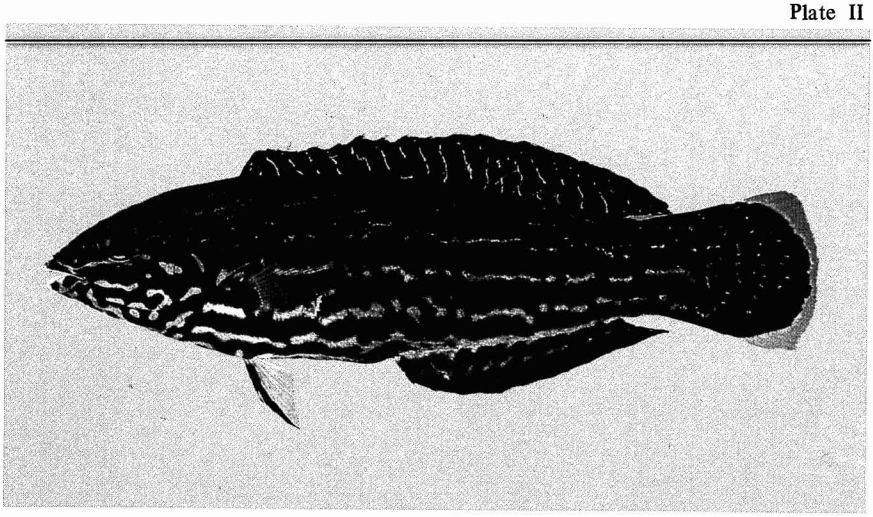
A. Holotype of *Coris pictoides*, ♀, 58.5 mm SL, Malaysia, BPBM 26412.



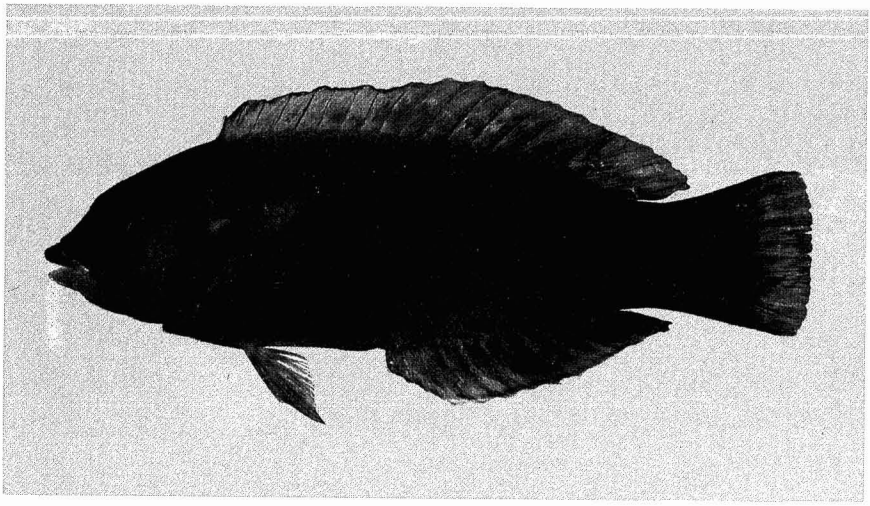
B. *Coris aurilineata*, ♀, 71.0 mm SL, Sydney Harbor, specimen lost.



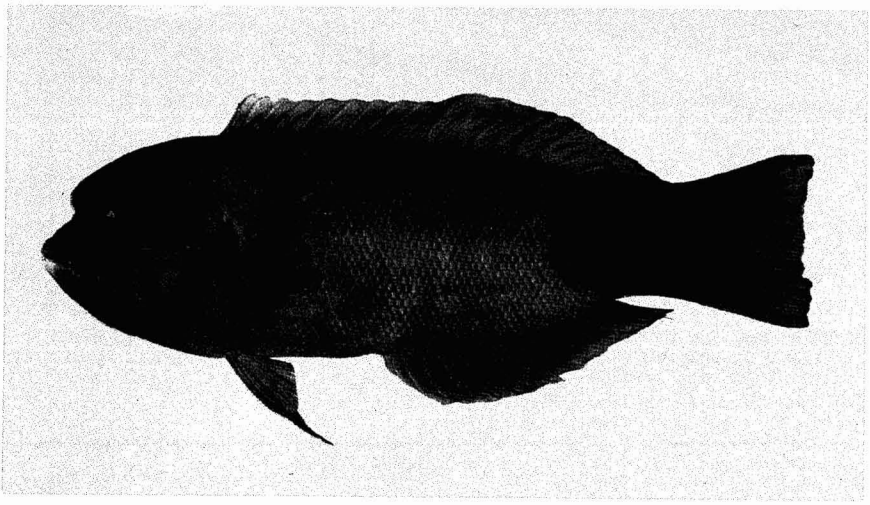
C. Holotype of *Coris aurilineata*, ♂, 87.6 mm SL, Queensland, NMV A. 1831.



A. Paratype of *Coris bulbifrons*, juv., 72.9 mm SL, Lord Howe Island, BPBM 14881.



B. Paratype of *Coris bulbifrons*, ♀, 227.5 mm SL, Lord Howe Island, BPBM 14845.



C. Holotype of *Coris bulbifrons*, ♀, 361.0 mm SL, Lord Howe Island, BPBM 14869.

only slightly smaller than scales of body, but becoming notably smaller ventrally; fins naked except for small scales on about basal two-fifths of caudal fin and an elongate large scale midventrally at base of pelvic fins.

Spines of fins pungent; origin of dorsal fin above second lateral-line scale; space between first 2 dorsal spines about two-thirds that between adjacent pairs of remaining spines; dorsal spines progressively longer, the first 5.95 (5.1–6.1) in head and the ninth 3.4 (3.0–3.6) in head; second to fifth dorsal soft rays longest, 2.55 (2.4–2.6) in head; all dorsal and anal soft rays branched, the last to base; origin of anal fin below base of first dorsal soft ray; first anal spine slender and short, contained about 1.6 times in second spine, its length 8.3 (6.5–9.3) in head; third anal spine longest, 3.85 (3.45–4.05) in head; second to sixth anal soft rays longest, 2.6 (2.55–2.75) in head; caudal fin rounded, 1.4 (1.4–1.5) in head; pectoral fins broadly rounded, the third and fourth rays longest, 1.75 (1.65–1.85) in head, the first ray rudimentary, the second unbranched; origin of pelvic fins below upper base of pectoral fins; pelvic spine slender; pelvic fins short, 2.0 (1.8–2.3) in head.

Color of holotype in alcohol: pale with a dark-brown stripe from front of upper lip, through eye, enclosing upper end of gill opening, passing along upper side of body and ending in upper middle part of caudal fin (stripe progressively broader from snout to body, where it maintains a nearly uniform width of about 1.5 orbit diameters); a second narrower and lighter-brown stripe beginning from same point on upper lip, passing slightly to one side of middorsal line of head to origin of dorsal fin and thence along base of fin, narrowing as it passes posteriorly, ending at rear base of fin (on nape this stripe about twice as broad as pale interspace between it and broader stripe); a vertically elongate black spot behind eye within lateral dark-brown stripe; fins pale except for a brown band along base of dorsal fin and the extension of lateral dark-brown stripe into caudal fin.

Males from Malaysia differ in having the upper edge of the brown basal band in the dorsal fin very dark brown anteriorly and a tiny black spot at upper base of pectoral fins. However, this spot is present on the two female paratypes from eastern Australia. The two smallest paratypes from Malaysia (29.6 and 41.0 mm SL) have an ocellated black spot in the caudal fin within the dark-brown stripe and a blackish spot basally in the soft portion of the dorsal fin between the seventh and eighth or eighth and ninth rays. These same two spots are present on the 51.9-mm paratype from Australia, though the caudal spot is not pale-rimmed. These spots are absent on the Malaysian specimens 50.2 mm SL and larger, but they are present on the two large males from Australia (though the dorsal spot has altered to a horizontally elongate marking very low in the fin).

Color of holotype when fresh: whitish, the centers of scales a little darker than edges, with two black stripes as described for the preserved specimen; a trace of blue on opercular flap below black stripe; dorsal fin yellowish with a white margin, faint blue longitudinal line in middle of fin (lower posteriorly), and a blackish band suffused with yellow at base; anal fin mottled yellowish and pale bluish (the yellowish predominating) with a white margin; caudal fin yellowish, especially basally, with faint streaks of bluish white, the distal part of upper and lower margins white; paired fins translucent with whitish rays; iris yellowish, tinged with light red, the middle part mainly blackish in line with lateral stripe.

The 64.2-mm male from Malaysia was very similar to the female holotype when fresh. It differed in having a yellow border on the lower edge of the lateral black stripe in the middle of the body, the blackish basal band of the dorsal fin tinged with red instead of yellow, above this a blue-edged yellow band, and the outer half of fin dull yellow-orange to the whitish margin; the anal fin was a darker yellow and had a narrow blue band near the base; the caudal fin was tinged with light red basally on the lobes.

The 89-mm male from New South Wales had light-red median fins, the dorsal with a narrow median longitudinal band of light yellow and the anal with a light-yellow band at the base.

REMARKS: This species of *Coris* is named *pictoides* from the Greek *oides* meaning "resembling" or "having the form of," in reference to its great similarity in color to *Coris picta* (Bloch and Schneider). The latter also occurs in eastern Australia, as well as in New Zealand and southern Japan. Randall and Araga (1978) have shown that *C. picta* is antitropical in its distribution.

Coris pictoides most resembles *C. picta* when it is small (it attains about 280 mm SL, in contrast to *C. pictoides* of which our largest specimen is 89 mm SL), before the broad black stripe on the upper side develops a wavy lower edge (and at adult size a series of bars projecting ventrally from the stripe). When small *C. picta* are compared with *C. pictoides* of the same size, two other color differences may be noted: the black lateral stripe on *C. picta* extends to the posterior margin of the caudal fin (although in adults it ends on caudal base), and there is a single middorsal dark stripe on the head instead of a double stripe as on *C. pictoides*.

There is only one difference in the principal meristic data for the two species, but it is very significant. *Coris picta* has 76–92 lateral-line scales in contrast to 48–51 for *C. pictoides*.

The present distribution of *Coris pictoides* is somewhat disjunct: Malaysia at nearly 30° N, Indonesia at 5° S, eastern Australia at 20° to nearly 34° S, and western Australia at 21° S.[4] We believe that further collecting will dispel the discontinuity in the range of this species. Some minor differences in color were noted between Australian and Malaysian specimens in the description above.

For a labrid fish, *Coris pictoides* shows very little difference in life color with sex (see color notes above). Our limited data suggest that it is monandric, as we have no small males and no large females when the sex is determined for specimens within the same area. The species appears to attain larger size in Australia, but this may be directly related to the cooler sea temperature there.

This species does well in aquariums, readily accepting a variety of animal food. Like most small wrasses, it buries in the sand at night to sleep.

Coris aurilineata, new species

Plate IB, C, Figure 2

HOLOTYPE: NMV A.1831, 87.6 mm SL, male, Australia, Queensland, Keppel Island (23°08′ S, 150°56′ E), 7 m, rubble and sand bottom with much algae and a few small isolated coral heads, hand net, B. T. Hose, 18 February 1981.

PARATYPES: BPBM 9409, 2: 38.3–67.8 mm SL, Australia, Queensland, Heron Island, J. Howard Choat, 1 February 1966; BPBM 19592, 98.4 mm SL, female, Australia, New South Wales, Sydney Harbor, Camp Cove (33°50′ S, 151°15′ E), 5 m, hand net, R. H. Kuiter, 28 April 1974; AMS I.18658-001, 69.2 mm SL, female, Australia, New South Wales, Sydney Harbor, Parsley Bay, 5 m, rocky with heavy growth of algae, hand net, R. H. Kuiter, 7 November 1974; NMV A. 1832-3, 2: 73.5–82.1 mm SL, males, same data as holotype; AMS I.22498-001, 2: 71.3–83.5 mm SL, female and male, respectively, same data as holotype; USNM 228464, 83.3 mm SL, male, same data as holotype; MNHN 1981–1049, 81.6 mm SL, female, Australia, New South Wales, Swansea Channel (33°05′ S, 151°39′ E), 4 m, hand net, R. H. Kuiter, 13 April 1980; CAS 48547, 68.4 mm SL, female, same data as holotype.

DESCRIPTION: Dorsal rays IX,12; anal rays III,12; pectoral rays 14; pelvic rays I,5; principal caudal rays 14 (median 12 branched); upper and lower procurrent caudal rays 6; pored lateral-line scales 50 (49–51; plus 1 posterior to base of caudal fin); scales above first lateral-line scale to origin of dorsal fin 5 (5–6); scales below lateral line to origin of anal 15 (15–16); circumpeduncular scales 30 (29–31);

[4] After the above was written, three specimens of *Coris pictoides* were found in the National Museum of Natural History that were collected from the steamer "Albatross" in the Philippines in 1908–1909: USNM 153976, 90 mm SL, Cebu; USNM 153977, 111 mm SL, locality only Philippines; USNM 15378, 67 mm SL, Jolo. These specimens were misidentified as *Coris flavovittata* (Bennett) by Fowler and Bean (1928) in *Bull. U.S. Natl. Mus.* 100, vol. 7, p. 311. *C. flavovittata* is endemic to the Hawaiian Islands.

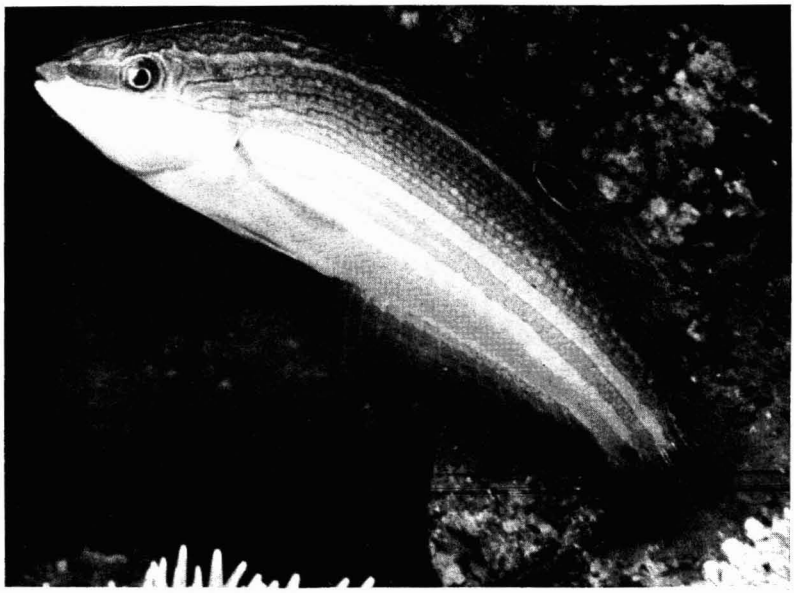


FIGURE 2. *Coris aurilineata*; 73 mm SL; Swansea, New South Wales (aquarium photograph).

gill rakers 18 (17–20); branchiostegal rays 6; vertebrae 10 + 15.

Body moderately elongate, the depth 3.4 (3.15–3.5) in SL, and compressed, the width 2.0 (1.8–2.25) in depth; dorsal profile of head smoothly convex; head length 3.1 (2.9–3.4) in SL; snout length 3.0 (2.85–3.15) in head; orbit diameter 5.3 (4.9–5.65) in head; interorbital space convex, the width 4.0 (3.75–4.25) in head; caudal peduncle about 1.7 times as deep as long, the least depth 2.0 (1.95–2.35) in head.

Jaws with an outer row of close-set, forward-projecting, conical teeth which are progressively longer anteriorly, the anterior pairs caninelike, somewhat recurved, the second pair about three-fourths as long as the first pair; side of upper jaw with 6 (6–7) conical teeth posterior to the first two pairs, and 1 canine (sometimes 2) at corner of mouth; side of lower jaw posterior to anterior two pairs of teeth with 8 (7–9) conical teeth; an inner row of smaller teeth in jaws, the most anterior (behind anterior canines) conical and somewhat compressed, the second tooth bluntly conical, and the remaining teeth nodular.

Pharyngeal dentition of 83.5-mm paratype: upper pharyngeal bone with 18 (left) and 20 (right) teeth in five anterior–posterior rows, the first row of 2 conical teeth (irregularly set), the second row of 3 (2 left, but 1 appears to be missing) teeth, the most lateral conical, the medial enlarged and molariform (missing on left), the third and fourth rows of 6 teeth (5 in third row left), the most lateral somewhat conical, the remaining bluntly conical to molariform, the medial enlarged, the fifth row of 3 molariform teeth; median limb of T-shaped lower pharyngeal bone with 17 teeth in two to three rows, the anterior teeth conical, becoming progressively more molariform posteriorly; posterior limb of pharyngeal bone with two to three rows of teeth, the most posterior row of 11 teeth, the median one a greatly enlarged ovate molar, the remaining teeth much smaller (progressively smaller and less molariform laterally).

Lips not fleshy, the outer surface smooth except posteriorly on side of upper lip where slightly plicate; inner surface of upper lip with 8 well-developed plicae; lower lip with a well-developed ventral flap. Tongue short and broadly rounded.

Gill membranes broadly attached to isth-

TABLE 2

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Coris aurilineata* (EXPRESSED AS A PERCENTAGE OF STANDARD LENGTH)

	HOLOTYPE,	PARATYPES								
	NMV A.1831	BPBM 9409	BPBM 9409	AMS I.22498-001	NMV A.1832	MNHN 1981–1049	NMV A.1833	USNM 228464	AMS I.22498-001	BPBM 19592
Standard length (mm)	87.6	38.3	67.8	71.3	73.5	81.6	82.1	83.3	83.5	98.4
Depth of body	29.9	27.5	28.7	29.5	31.7	30.7	29.5	31.7	28.4	28.4
Width of body	14.3	14.4	13.0	15.6	15.0	13.7	14.8	14.6	14.8	13.0
Head length	31.7	33.9	34.6	34.5	32.1	31.3	31.2	32.2	31.3	29.4
Snout length	10.5	10.4	11.0	10.5	10.3	10.0	10.1	10.8	10.6	9.7
Orbit diameter	6.0	9.3	6.9	6.2	6.5	5.5	6.3	5.9	5.6	5.2
Interorbital width	8.4	9.1	8.1	8.6	9.5	7.6	7.6	8.5	8.1	7.1
Depth of caudal peduncle	16.0	13.6	14.7	15.7	15.3	15.7	15.5	16.0	15.9	14.3
Length of caudal peduncle	10.0	9.4	8.0	9.3	9.3	8.9	8.0	8.6	9.2	9.1
Predorsal length	27.5	33.7	31.4	30.3	27.1	27.9	28.5	28.3	28.8	28.9
Preanal length	55.0	57.4	55.3	56.1	54.4	56.8	54.9	54.0	54.0	54.1
Prepelvic length	30.3	32.6	32.4	31.7	30.6	28.0	30.0	29.4	29.5	27.8
Length of first dorsal spine	4.9	5.7	4.7	4.2	4.2	4.9	4.4	5.8	5.6	4.9
Length of ninth dorsal spine	9.7	9.9	9.6	8.5	9.4	8.5	9.7	10.2	9.6	9.4
Length of longest dorsal ray	10.8	11.0	12.6	10.9	10.9	10.5	11.0	11.5	10.2	11.1
Length of first anal spine	3.4	3.9	4.0	3.5	3.3	4.1	3.2	4.7	4.5	3.8
Length of third anal spine	8.4	9.1	9.2	8.7	7.5	8.5	8.8	8.7	8.8	8.5
Length of longest anal ray	10.7	11.7	9.8	9.2	10.2	9.2	10.3	9.5	10.8	9.5
Length of caudal fin	20.2	19.0	22.1	19.2	19.4	18.9	19.3	20.7	21.9	18.4
Length of pectoral fin	20.2	23.5	20.6	21.0	18.9	Damaged	20.7	19.4	20.7	17.8
Length of pelvic spine	12.7	11.7	10.8	9.7	11.3	Damaged	9.6	11.0	11.6	8.8
Length of pelvic fin	17.8	16.2	18.6	14.7	16.5	14.5	16.5	15.5	18.2	15.6

mus with a free fold across; longest gill filaments of first arch contained about 2 times in orbit diameter; gill rakers moderate, the longest on first arch about a third length of longest gill filament.

Lower margin of preopercle free to below anterior edge of orbit; upper margin of preopercle free nearly to level of lower edge of orbit.

Anterior nostril in a membranous tube in front of dorsal fourth of orbit; posterior nostril larger, oval, covered by a flap from the front, anterior to upper eighth of orbit; internarial distance about one-fourth orbit diameter.

Suborbital pores rimming eye from midposteriorly to below front edge of orbit 13; pores along free margin of preopercle 10, with another 3 anterior in mandibular series; a series of 6 pores beginning posteriorly on each side of interorbital space and ending anteriorly to anterior nostril; a pore just ventral to anterior nostril; a single pore in midinterorbital space; a series of 8–9 pores across upper edge of operculum from front of lateral-line origin to above posterior edge of orbit.

Lateral line continuous, rising gradually at its origin, following contour of back to beneath base of tenth dorsal soft ray, then angling sharply downward to straight midlateral peduncular portion; tubules of most lateral-line scales of anterior half of body with oblique dorsal and ventral branches, each ending in a single pore; remaining scales with one pore.

Head naked except for small scales on nape in about nine diagonal rows which extend to a vertical at upper end of preopercular margin; scales on side of thorax only slightly smaller than scales of body, but becoming notably smaller ventrally; fins naked except for small scales on about basal one-third on caudal fin, and an elongate large scale midventrally at base of pelvic fins.

Spines of fins pungent; origin of dorsal fin above third lateral-line scale; space between first 2 dorsal spines about two-thirds that between adjacent pairs of remaining spines; dorsal spines progressively longer, the first 5.0 (4.6–5.25) in head and the ninth 2.8 (2.5–3.25) in head; first to fifth dorsal soft rays longest, 2.45 (2.2–3.15) in head; first dorsal soft ray not branched in some specimens (4 out of 11); all other dorsal and anal soft rays branched, the last to the base; origin of anal fin below base of first dorsal soft ray; first anal spine slender and short, contained about 1.8 times in second spine, its length 7.3 (5.9–8.4) in head; third spine longest, 3.5 (3.2–3.8) in head; first to sixth anal soft rays longest, 2.85 (2.55–3.15) in head; caudal fin rounded, 1.4 (1.25–1.55) in head; pectoral fins broadly rounded, the third and fourth ray longest, 1.75 (1.65–1.9) in head, the first ray rudimentary, the second unbranched; origin of pelvic fins below upper base of pectoral fins; pelvic spine slender; pelvic fins short, 2.1 (1.15–2.45) in head.

Color of holotype in alcohol: pale greenish with gray longitudinal lines following scale rows extending posteriorly from nape and base of pectoral fin; six faint evenly spaced dark bars on upper half of body; a vertically elongate dark spot behind eye; a broad dusky stripe from upper lip to orbit; a pale line from below eye, passing posteriorly where it branches into three parts which continue onto dorsal and posterior part of opercular flap; a second broader pale band on cheek below eye, passing to edge of operculum at level of upper pectoral base; fins pale greenish, the dorsal with two faint longitudinal bands; a black spot at upper base of caudal fin on upper three principal rays; a subtriangular black spot on upper base of pectoral fin.

Color of holotype (a male) when fresh: green dorsally, becoming lighter green ventrally, with orange-yellow lines as described for the preserved specimens and a broad pale-yellow stripe along lower part of body; orange-yellow lines interrupted on upper side of body by five irregular narrow green bars; lines dorsally on head salmon pink edged with pale blue; two short parallel dark-blue lines behind eye; head below lower edge of orbit light greenish yellow with an irregular longitudinal salmon pink band; dorsal fin yellowish green with a pale-blue margin and two orange-yellow longitudinal bands faintly and narrowly edged in red and pale blue (lower band one-third way out in fin and the second two-thirds distance to margin); anal fin yellowish

green with a pale-blue margin and two longitudinal dull-orange bands edged in pale blue (a third faint dull-orangish band is submarginal to the blue margin); caudal fin green with longitudinal narrow streaks of yellow and a black spot larger than pupil at base of upper three principal rays; pectoral fins pale green with a light-red band at base and a large subtriangular, greenish-black spot on upper two-thirds of base anterior and adjacent to red band; pelvic fins pale green with a streak of orange on second membrane; iris blue-green with an inner and outer ring of bright orange.

The 73.5-mm male differed from the holotype when fresh in having the lines on the head and body more orange.

Females are similar to males in life color, differing notably in having a large, elliptical, blue-edged, black spot basally in the soft portion of the dorsal fin; also, the black spot at the upper base of the caudal fin is edged in blue.

REMARKS: This species of *Coris* is named *aurilineata* in reference to the golden-yellow lines in life, found in both juvenile and adult stages.

Coris aurilineata appears to be restricted to eastern Australia from southern Queensland to central New South Wales. It is commonly found on inshore reefs in southern Queensland, particularly on substrata in depths of 3–10 m, dominated by dense growth of algae (B. T. Hose, personal communication).

Unlike most labrid fishes, *Coris aurilineata* shows little difference in life color with sex, except for the ocellus in the dorsal fin of the female. Our few specimens are unusual for the Labridae because the largest mature individual (98.4 mm SL) is a female whereas the smallest mature fish (73.5 mm SL) is a male. The sex of the smallest paratype could not be determined. It is expected, however, that a larger series of specimens from the same area would demonstrate that males, on the average, are larger than females.

Coris bulbifrons, new species

Plate IIA–C, Figures 3–5

Coris aygula (non Lacépède) Ogilby, 1889, Mem. Austral. Mus., no. 2, p. 68 (Lord Howe Island).

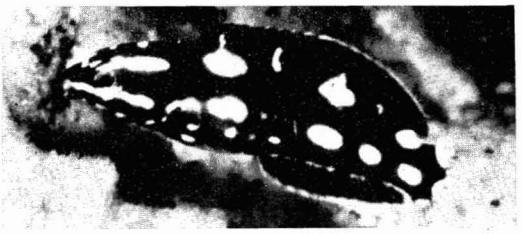


FIGURE 3. *Coris bulbifrons*; about 20 mm SL; Seal Rocks, New South Wales (aquarium photograph).

Coris cyanea (non Macleay) Whitley, 1937, Austral. Zool., vol. 8, p. 227, pl. 13, fig. 3 (Middleton Reef); Whitley, 1951, Rec. Austral. Mus., vol. 22, p. 401, fig. 8 (Lord Howe Island).

Coris sp. Allen et al., 1976, Rec. Austral. Mus., vol. 30, p. 419 (Lord Howe Island).

HOLOTYPE: BPBM 14869, 361.0 mm SL, 1.72 kg, female, Lord Howe Island, reef south of Phillip Point, 10 m, spear, J. E. Randall, 16 February 1973.

PARATYPES: AMS I.1947, 79.0 mm SL, Lord Howe Island (31°32′ S, 159°04′ E), E. H. Saunders, 1888; AMS I.1957, 2: 51.0–468.0 mm SL, same data as preceding; AMS I.1958, 168.5 mm SL, same data as preceding; AMS I.4644, 29.6 mm SL, Lord Howe Island, F. Farrell, September 1900; AMS I.7055, 173.2 mm SL, Lord Howe Island, T. Nicholls, January 1905; AMS I.13678, 367.0 mm SL, Lord Howe Island, P. R. Pedley, December 1915; AMS IA.935, 217.4 mm SL, Lord Howe Island, R. Baxter, August 1922; AMS IA.2419, 2: 14.9–54.9 mm SL, Lord Howe Island, A. McCulloch, February 1925; AMS IB.6402, 239.5 mm SL, Norfolk Island (29°04′ S, 167°57′ E), lagoon at Kingston, L. Thomas, 26 November 1961; AMS IB.5520, 57.4 mm SL, Lord Howe Island, rocky area, J. Booth, March 1962; AMS IB.5521, 34.7 mm SL, same data as preceding; AMS IB.6389, 61.0 mm SL, Lord Howe Island, rocky area, J. Booth, February 1963; AMS IB.6436, 104.0 mm SL, Lord Howe Island, lagoon, J. Booth, May 1963; AMS I.1587-001, 447.0 mm SL, Byron Bay (28°38′ S, 153°37′ E), purchased in Sydney fish market, 25 May 1970; AMS I.17359-021, 72.8 mm SL, Lord Howe Island, Sylph's Hole, 2–4 m, spear,

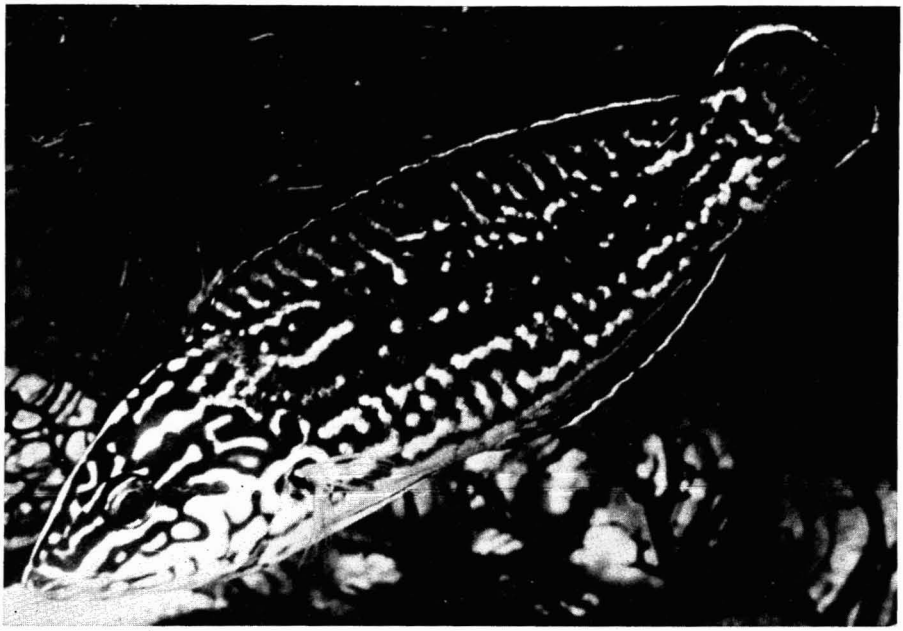


FIGURE 4. *Coris bulbifrons*; about 130 mm SL; same individual as Figure 3 (still alive in aquarium at Manly Marineland).

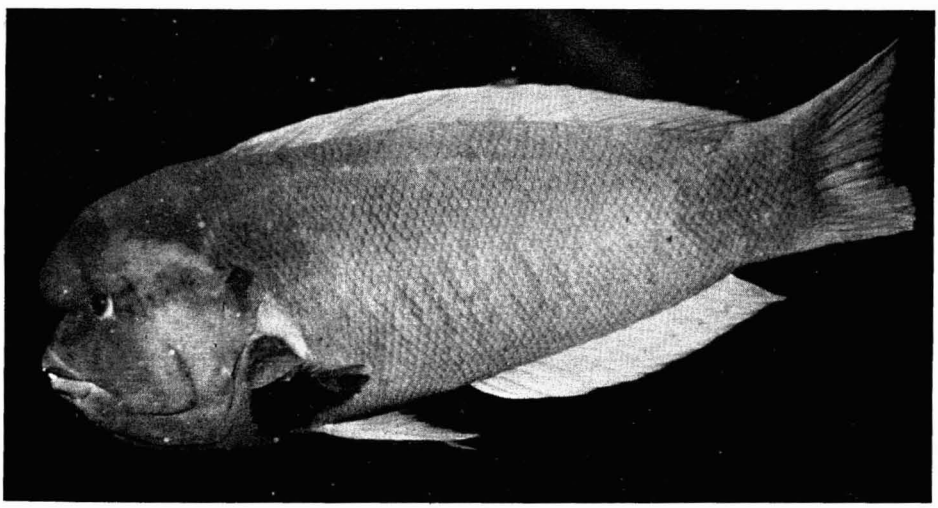


FIGURE 5. *Coris bulbifrons*; about 900 mm (3 ft) total length; Lord Howe Island lagoon (underwater photograph by Adrian Neumann).

TABLE 3

PROPORTIONAL MEASUREMENTS OF TYPE SPECIMENS OF *Coris bulbifrons* (EXPRESSED AS A PERCENTAGE OF STANDARD LENGTH)

	HOLOTYPE,	PARATYPES						
	BPBM 14869	AMS IA.2419	BPBM 14881	BM(NH) 1981.2.11.2	USNM 225236	AMS I.7055	BPBM 14845	AMS I.1587-001
Standard length (mm)	361.0	54.9	72.9	110.0	115.2	173.2	227.5	447.0
Depth of body	36.0	27.5	29.1	28.2	27.6	30.0	33.5	34.5
Width of body	14.6	11.7	12.3	11.9	11.5	12.8	13.6	12.1
Head length	34.2	33.1	35.0	33.5	32.6	33.8	33.3	36.7
Snout length	12.1	10.1	10.3	11.7	10.2	13.2	11.8	14.8
Orbit diameter	3.5	5.8	5.1	5.6	5.4	4.7	4.3	3.5
Interorbital width	8.8	6.2	6.2	5.7	6.0	7.0	7.4	9.6
Depth of caudal peduncle	17.1	15.7	15.1	15.5	16.0	17.1	17.0	15.9
Length of caudal peduncle	11.2	10.0	9.6	10.2	9.7	10.2	10.5	9.6
Predorsal length	34.8	33.1	33.8	34.5	32.0	32.9	32.1	36.2
Preanal length	57.7	54.6	55.1	56.2	56.1	57.7	56.5	58.5
Prepelvic length	34.0	33.8	33.4	32.7	31.6	34.2	32.8	36.2
Length of first dorsal spine	6.3	6.4	Broken	6.2	6.1	7.2	6.4	7.3
Length of ninth dorsal spine	10.3	11.7	12.1	10.8	10.5	10.3	11.0	10.3
Length of longest dorsal ray	14.0	14.2	14.8	14.4	14.1	14.2	14.5	15.1
Length of first anal spine	3.9	3.9	4.1	4.2	3.9	4.0	4.1	4.3
Length of third anal spine	8.3	9.2	8.9	8.2	8.4	8.7	8.9	9.7
Length of longest anal ray	13.6	13.3	13.6	13.2	13.4	13.3	14.5	15.3
Length of caudal fin	22.0	22.8	22.2	21.4	21.1	21.4	21.7	24.4
Length of pectoral fin	21.8	20.4	21.3	19.7	20.1	20.7	21.6	23.4
Length of pelvic spine	12.0	10.4	10.6	10.5	11.3	10.5	11.3	12.3
Length of pelvic fin	23.3	15.3	17.6	17.0	17.4	18.7	19.1	23.1

quinaldine and hand net, Australian Museum party, 5–27 February 1973; AMS I.17360-016, 105.2 mm SL, Lord Howe Island, northwest side, off Phillip Point, 15–20 m, spear and quinaldine, Australian Museum party, 6–7 February 1973; AMS I.17361-003, 194.0 mm SL, Lord Howe Island, off Erskine Valley Stream, 15 m, Australian Museum party, 6–7 February 1973; AMS I.17393-005, 150.5 mm SL, Lord Howe Island, off Phillip Point, 8–10 m, spear, Australian Museum party, 7–9 February 1973; AMS I.17368-028, 130.0 mm SL, Lord Howe Island, south end of Middle Beach, 0–3 m, rotenone and spear, Australian Museum party, 11–15 February 1973; AMS I.17369-014, 121.3 mm SL, Lord Howe Island, lagoon, Salmon Beach, 0.5–2 m, rotenone, Australian Museum party, 14 February 1973; BPBM 14845, 227.5 mm SL, female, Lord Howe Island, northwest corner of island, New Gulch, 18 m, spear, J. E. Randall, 14 February 1973; BM(NH) 1981.2.11.2, 110.0 mm SL, Lord Howe Island, southern lagoon off King's Beach, 1–2 m, rotenone, J. R. Paxton, D. F. Hoese, G. R. Allen, and G. P. Whitley, 14 February 1973; USNM 225236, 115.2 mm SL, same data as preceding; AMS I.17371-017, 2: 75.8–76.5 mm SL, Lord Howe Island, reef south of North passage, 0–2 m, rotenone and spear, Australian Museum party, 11–15 February 1973; BPBM 14881, 72.9 mm SL, juvenile, same locality as preceding, lagoon side, 2 m, spear, G. R. Allen, 17 February 1973; AMS I.20268-016, 115.0 mm SL, Norfolk Island, Point Hunter, 0–1 m, D. Hoese and party, 19 September 1975.

DESCRIPTION: Dorsal rays IX,12; anal rays III,12; pectoral rays 14 (13–15, usually 14); pelvic rays I,5; principal caudal rays 14 (median 12 branched); upper and lower procurrent caudal rays 6; pored lateral-line scales 64 (61–66, plus 2 or 3 posterior to base of

caudal fin); scales above lateral line to origin of dorsal fin 10 (9–11); scales below lateral line to origin of anal fin 28 (26–28); circumpeduncular scales 40 (39–41); gill rakers 19 (18–21); branchiostegal rays 6; vertebrae 10 + 15.

Body moderately elongate, the depth 2.8 (2.9–3.65) in SL, and compressed, the width 2.45 (2.3–2.85) in depth; adults with a prominent hump anterodorsal to eye; head length 2.9 (2.7–3.05) in SL; snout length 2.85 (2.5–3.4) in head; orbit diameter 9.8 (5.7–10.5) in head; interorbital space convex, the width 3.9 (3.8–5.9) in head; caudal peduncle deeper than long, the depth 2.0 (1.95–2.3) in head.

Jaws with an outer row of close-set, forward-projecting, conical teeth which are progressively longer anteriorly, the most anterior pair as strong slightly recurved canines which are about twice as long and stout as adjacent posterior teeth (this second pair of teeth about twice as long and wide as the next teeth on large individuals); side of jaws with 8 (7–10.0) conical teeth posterior to anterior canines; no canine at corner of mouth (but may be present on large males—none available for study).

Pharyngeal dentition of 110-mm paratype: each upper pharyngeal bone with about 22 teeth in six rows, the first three irregular rows of small bluntly conical teeth, the fourth and fifth rows each with 2 enlarged molars, the most medial of the fourth row about twice as large as the others; teeth lateral to molars very bluntly conical, and posterior teeth as small molars; median limb of T-shaped lower pharyngeal bone with about 20 small teeth in an elongate elliptical patch four rows of teeth across width at widest place, the most anterior and lateral teeth bluntly conical, the remaining teeth molariform; midposterior tooth of posterior limb of lower pharyngeal bone a very large subtriangular molar (its length nearly one-third orbit diameter); remaining teeth of posterior limb consisting of about 35 small, close-set molars (except extreme lateral teeth which are bluntly conical) in three rows medially, narrowing to two laterally.

Lips finely and irregularly plicate externally, the upper lip with 6 prominent plicae on inner surface; lower lip with a well-developed ventrally projecting flap along side of jaw. Tongue short and broadly rounded.

Gill membranes broadly attached to isthmus with a free fold across; longest gill filaments on first gill arch of holotype nearly as long as orbit diameter; longest gill raker on first arch about half length of longest gill filament.

Lower margin of preopercle free to below anterior edge of orbit; upper margin of preopercle free to level of dorsal edge of upper lip.

Nostrils of holotype anterior to middle of eye (anterior to upper third in smaller paratypes) by a distance about equal to half orbit diameter; anterior nostril in a short fleshy tube without an elongate posterior flap; posterior nostril narrowly ovate, covered by a flap from the anterior edge; internarial distance about equal to one-fourth orbit diameter.

Suborbital pores rimming eye from midposteriorly to below front edge of orbit 9 (8–12), 2 to 5 of these as pairs perpendicular to orbit; pores along free margin of preopercle 9 (9–10), with another 4 pores anterior to these in the mandibular series; a series of 6 pores beginning posteriorly on each side of interorbital space and ending anterior to nostrils, the third pore from the front forming the apex of a triangle, the nostrils being the base; a pore diagonally ventroanterior from anterior nostril; a series of 8–9 pores across upper edge of operculum from front of lateral-line origin to above posterior part of orbit.

Lateral line continuous, rising steeply from above gill opening, following contour of back to below base of ninth or tenth dorsal soft ray, then deflected sharply downward to straight midlateral peduncular portion; each lateral-line scale with a single pore.

Head naked except for small scales on nape in about 19 diagonal rows, the most anterior reaching a vertical at posterior edge of orbit; scales on side of thorax about one-half to two-thirds as high as scales on side of body, becoming very small ventrally; fins naked except for small scales basally on caudal fin which extend as rows of single scales on membranes between rays about half the distance to posterior edge of fin; a fleshy triangular scale midventrally at base of pelvic fins.

Spines of fins pungent except pelvic spine

which is slender and somewhat flexible; origin of dorsal fin above third lateral-line scale; space between first two dorsal spines about two-thirds as broad as space between adjacent pairs of remaining spines; dorsal spines progressively longer, the first 5.4 (4.7–5.4) and the ninth 3.3 (2.85–3.55) in head; second to eighth dorsal soft rays subequal, the longest 2.45 (2.3–2.45) in head; all dorsal and anal rays branched, the last to base; origin of anal fin below base of first or second dorsal soft ray; first anal spine slender and short, about two-thirds length of second spine, 8.8 (8.0–8.55) in head; third anal spine longest, 4.1 (3.4–4.1) in head; second to seventh anal soft rays subequal, the longest 2.5 (2.3–2.55) in head; caudal fin varying from slightly rounded in juveniles and subadults to slightly emarginate in adults, its length 1.55 (1.45–1.6) in head; pectoral fin pointed dorsally, the third ray slightly the longest, 1.55 (1.55–1.7) in head; origin of pelvic fins below upper base of pectoral fins; pelvic fins short in juveniles, becoming longer in adults, reaching anus on holotype and 227.5-mm paratype, the length 1.45 (1.6–2.15) in head.

Color of holotype in alcohol: dark grayish brown, the head darker than body; caudal peduncle slightly darker than rest of body; a blackish spot on opercular flap.

Color of 72.9-mm paratype in alcohol: body with irregular, broad, dark-brown stripes alternating with narrow, pale-tan stripes (about six of each), the dark stripes about 3 to 4 times broader than the pale stripes except ventrally where the lowermost pale stripe is about half as broad as the dark; head with highly irregular broad dark bands alternating with narrow pale-tan ones; a blackish spot larger than pupil posteriorly on opercular flap (except for pale margin); dorsal fin dark brown with near-vertical, irregular, pale bands and a whitish margin; anal fin dark brown with a row of pale spots basally, another row nearly halfway out in fin, and a whitish margin; caudal fin dark brown with three narrow curved pale bands, the border of posterior half of fin whitish (broad at corners, narrow midposteriorly); pectoral fins pale, the extreme base brown; pelvic fins pale with a brown lateral edge.

The 110-mm paratype has irregular dark stripes on the body like the 72.9-mm paratype, but these are more numerous (about nine) and fainter. The pattern of irregular dark bands on the head is similar to the smaller fish.

The 115.2-mm paratype has completely lost the dark stripes on the body but still has the dark irregular bands faintly visible on the head, the darkest being the margin of the operculum beginning with the black spot on the opercular flap.

Color of holotype when fresh: body bluish gray with a large blackish elliptical area covering the entire caudal peduncle, the rounded front part extending anterior to peduncle and the posterior part covering all of basal scaled part of caudal fin; head purplish gray; opercular flap with a large dark-purplish area (almost black) containing two short pale-yellowish lines; front of lower lip pale; fins bluish gray.

When fresh, the 72.9-mm paratype had dark-brown (nearly black) stripes and bands with a purplish cast alternating with narrow whitish ones; the iris was dark yellow with four large blackish blotches.

REMARKS: *Coris bulbifrons* is named from the Latin *bulbus*, meaning "swelling" or "bump," and *frons*, meaning "forehead," in reference to the prominent convexity that develops on the head anterodorsal to the eye of adults of both sexes. This bump is already clearly visible on the 227.5-mm female paratype.

This species is well known at Lord Howe Island, where it is called the "doubleheader." Angling records have been kept for it over the years; the largest taken weighed 14 lb (6.35 kg) (Nick Potter, personal communication).

The first record of this fish was that of Ogilby (1889), who reported on five specimens from 2.3 to 28 in. total length from Lord Howe Island, as *Coris aygula*. He noted the young or half-grown as being taken in rock pools and the adults "by line in the open sea," adding that they are "eaten with avidity."

By "open sea" Ogilby probably meant away from the shore, because the species is not uncommon in the lagoon of Lord Howe Island (maximum depth 8 m), although it also occurs outside the reef. It is rarely seen in

more than 20 m. It is usually found in groups, one member of which may be very large.

The misidentification of *Coris bulbifrons* as *C. aygula* by Ogilby can perhaps be understood because the latter is also a large species with a pronounced gibbosity on the forehead and has the same meristic data. However, the two species differ in color in all stages of growth. The young of *C. aygula* are whitish with two hemispherical orange spots on the back, above which, in the dorsal fin, are large ocellated black spots; there are small black spots on the head and anteriorly on the body. The next stage is olivaceous with a pale bar on the side of the body above the anus; this phase retains the anterior dark spots. Large adult males are dark greenish with a broad pale bar passing dorsally from the anterior part of the anal fin; the first two dorsal spines are produced, and the caudal rays are exserted.

Whitley (1937) reported the presence of *Coris bulbifrons* (as *C. cyanea* Macleay) at Middleton Reef (29°20′ S, 158°48′ E). He wrote that it "browses over the coral reefs at half-tide, often exposing the back out of water." His use of the word "browze" need not imply that this species is a plant-feeder. Material seen in the gut of some of our type specimens (without removal of any of it) indicates feeding primarily on gastropods and pelecypods, with some ingestion of crabs.

Whitley (1951: 401, fig. 8) illustrates a small juvenile of this species from Lord Howe Island. We examined this tiny specimen, AMS IA.2419, 14.9 mm SL. It is blackish with medium and large-sized white spots and a white stripe from upper lip through lower part of eye to upper pectoral base.

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